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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,208	03/16/2004	Kwang-hee Lee	5649-1277	2034
20792 7590 04/16/2008 MYERS BIGEL, SIBLEY & SAJOVEC PO BOX 37428 RALEIGH, NC 27627				
EXAMINER				
TRAN, THANH Y				
ART UNIT		PAPER NUMBER		
2892				
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04/16/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/801,208

Applicant(s)

LEE ET AL.

Examiner

THANH Y. TRAN

Art Unit

2892

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-14 and 34-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4-8, 14, 34-45 and 47 is/are allowed.
- 6) ☒ Claim(s) 2, 3, 9-11, 13 and 46 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. In view of the Appeal Brief filed on 01/03/08, PROSECUTION IS HEREBY REOPENED. A new ground of rejection set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 13 and 2-3 are rejected under 35 U.S.C. 102(e) as being anticipated by Iizuka et al (U.S. 2002/0190294).

As to claim 13, Iizuka et al discloses in figures 9I-9N a method of fabricating an electrode for a microelectronic device, the method comprising: forming a ruthenium seed layer ("lower electrode" 34) using atomic layer deposition ("ALD") on a semiconductor substrate (21) (see paragraphs [0133] & [0051]); forming a main ruthenium layer ("upper electrode" 36a) on the ruthenium seed layer (34); and patterning the main ruthenium layer ("upper electrode" 36a) and the ruthenium seed layer ("lower electrode" 34) to form the electrode; wherein the main ruthenium layer ("upper electrode" 36a) is formed using chemical vapor deposition ("CVD") (see paragraphs [0111] & [0058]).

As to claim 2, Iizuka et al discloses in figures 9I-9N a method further comprising: forming a dielectric layer (38) on the electrode; and forming an upper electrode (36b) on the dielectric layer (38) to provide a capacitor.

As to claim 3, Iizuka et al discloses in figures 9I-9N a method further comprising: forming a storage node contact plug ("capacitor contact" 31) on the semiconductor substrate (21) and a storage node ("cell contact" 28) that is electrically connected to the storage node contact plug ("capacitor contact" 31) to provide a semiconductor memory device, wherein the ruthenium seed layer (34) is formed on the storage node contact plug ("capacitor contact" 31).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 9-11 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iizuka et al (U.S. 2002/0190294).

As to claim 9, Iizuka et al does not disclose the ruthenium seed layer having a thickness of about 5 Å to 50 Å, and the main ruthenium layer having a thickness of 50 Å to 300 Å. However, the thickness range for a layer would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore, the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

As to claim 10, Iizuka et al does not disclose supplying oxygen at a flow rate of about 1 sccm to 50 sccm for forming of the main ruthenium layer; and supplying a ruthenium source at a flow rate of about 0.1 ccm to 2 ccm under a pressure of about 0.4 Torr to 0.6 Torr. However, a flow rate of supplying oxygen of about 1 sccm to 50 sccm, or a flow rate of a ruthenium source about 0.1 ccm to 2 ccm under a pressure of about 0.4 Torr to 0.6 Torr would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore, the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

As to claim 11, Iizuka et al does not disclose the dielectric layer comprises a tantalum oxide layer. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Iizuka et al by using a tantalum oxide material for a dielectric layer for providing a suitable high-k material for the dielectric layer, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended used and because such material substitution or replacement would have been considered a mere substitution of art-recognized equivalent values, MPEP 2144.06.

As to claim 46, Iizuka et al does not disclose the hydrogen containing gas which does not include oxygen. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Iizuka et al by using hydrogen containing gas which does not include oxygen for forming an electrode for a microelectronic device, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use and because such material substitution or replacement would have been considered a mere substitution of art-recognized equivalent values, MPEP 2144.06.

Allowable Subject Matter

6. Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record and to the examiner's knowledge does not teach or render obvious, at least to the skilled artisan, the instant invention regarding a method of fabricating an electrode for a microelectronic device, particularly characterized by forming a main ruthenium layer using chemical vapor deposition on a ruthenium seed layer using atomic layer deposition; forming a second ruthenium seed layer using atomic layer deposition on the dielectric layer; and forming a second main ruthenium layer on the second ruthenium seed layer, as defined in independent claim 13, and dependent claims 2 and 12.

7. Claims 4-8, 14, 34-45 and 47 are allowed.

8. The following is an examiner's statement of reasons for allowance:

The prior art of record and to the examiner's knowledge does not teach or render obvious, at least to the skilled artisan, the instant invention regarding a method of fabricating an electrode for a microelectronic device, particularly characterized by forming a main Ru layer on the Ru seed layer formed by using atomic layer deposition; patterning the main Ru layer and the Ru seed layer to form the electrode; and injecting oxygen containing gas and hydrogen-containing gas into the chamber for forming the Ru seed layer using atomic layer deposition, as defined in claims 4 and 35. Claims 5-8, 14, 34-45 and 47 are dependent upon independent claims 4 and 35.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

9. Applicant's arguments with respect to claims 2-3, 9-11, 13 and 46 have been considered but are moot in view of the new ground(s) of rejection.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Y. Tran whose telephone number is (571) 272-2110. The examiner can normally be reached on M-F (9-6:30pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao X. Le, can be reached on (571) 272-1708. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/T. Y. T./

Examiner, Art Unit 2892

/Thao X Le/

Supervisory Patent Examiner, Art
Unit 2892

